



Property, Development & Retail Management

Catastrophic Events

Mandatory - December 2013



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Way



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Essential information about our
Health & Safety Standards.

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Catastrophic Events

Overview

Over the decades a number of incidents, both in GB and worldwide, have demonstrated the potential for catastrophic incidents to occur during the active phases of construction projects. In 2009 HSE contracted with the Construction Industry Research and Information Association (CIRIA) to explore the topic in more detail. The research report – RR834 was published and HSE was keen that momentum was maintained.

The construction industry recognises the hazardous nature of its activities, which manifests itself in the high toll of accidents its workers suffer compared with other industries. These range from lost time injuries to fatalities. There is also a high incidence of ill-health among construction workers including fatal diseases such as cancer arising from asbestos exposure. However, the industry may not be sufficiently aware of the potential for it to be associated with more major events (those involving multiple deaths and/or significant damage to property and infrastructure). These major or catastrophic events may have wide implications such as extensive delay or project failure, significant business impact, loss of money and loss of reputation for all concerned. Health and safety risk management in the industry has traditionally focused upon preventing accidents

arising from the most significant hazards such as falls from height (the biggest killer on site) but more recently there has been a welcome growth in the understanding of latent health problems, which can emerge years after exposure.

And increasingly, larger construction organisations have been applying 'holistic' risk management techniques to manage project risk and low probability but high-consequence issues will have been included in these considerations. Many of the issues addressed have had purely commercial consequences e.g. sudden loss of a major contract or customer. However, some have health and safety implications.

In even more hazardous industries such as the chemical, oil and gas and the nuclear and rail industries, major hazard scenarios are required to be examined in depth. These potentially catastrophic events are sometimes referred to as 'Top Events'. It is appreciated that they can have a disastrous impact on a company's reputation and well-being and upon society. The process of examining the risk of a catastrophic event requires that a 'safety case' is prepared, based upon a safety risk assessment. This project has looked at the risks of 'Catastrophic Events' in the UK construction industry as follows:

- The types of catastrophic event, which have occurred or which might occur during construction
- The reasons for occurrence when there have been (or could have been) catastrophic events during construction, including an examination of the underlying factors
- The controls which should contribute to an avoidance of a catastrophic event
- Where the UK construction industry could improve.

Landsec require evidence from the contractor that they have used this Standard when carrying out project risk management.

Noted below is a useful guide for use prior to construction by our project teams.





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Catastrophic events in construction - factors determining catastrophic potential

Catastrophic events are characterised by two key features – (i) the low probability of their occurrence; and (ii) the potential or realised level of damage that can be caused when they do occur. Tempting though it might be, it would be very difficult and potentially overly simplistic to provide a list of the types of events that fall within or outside any given definition of a catastrophic event.

However, those involved in construction need to be able to identify those projects and activities where catastrophic potential might exist so it can bring to bear appropriate risk management techniques above and beyond the normal systems employed to manage risk.

Engineered safety is the focus of engineering and management skills on preventing catastrophic incidents and near misses, particularly the uncontrolled release of energy or dispersion of contaminants sufficient to cause or risk significant harm. All sources of energy must be considered, even if not under the direct control of the operational management, and must be considered throughout the

project life-cycle. The skills required exceed those needed for managing workplace safety, and must embrace the ability to apply engineering science in practice. Particular hazards to consider include structural stability and integrity, behaviour of heavy moving objects including vehicles, electrical power isolation and containment, errant and unthinking behaviour, fail safe design, redundancy and time-related degradation.

This document sets out factors tending towards or away from events with catastrophic potential to ensure attention and resources can be focused where they are most needed. A single factor may be sufficient to indicate catastrophic potential but, equally, it may arise from a combination of factors when applied together.

Ultimately, construction companies will have to make appropriate judgements on a project by project basis.





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Factors tending towards

High potential energy within system:

- Multi-storey buildings or structures liable to complete collapse
- Release of flammable gases under high pressure
- High fire risk – multi-storey timber frame buildings undergoing construction

Potential energy released instantaneously:

- No early warning signs likely to be detectable before failure commences
- Complete collapse of the building or structure is likely to occur
- Energy release will be uncontrolled and unpredictable in terms of distribution and direction
- Instantaneous explosion potential high
- Fire could spread rapidly and uncontrollably with insufficient time to respond to alarms or other warning signs

Potential domino effect:

- Adjoining buildings, structures, services and transport corridors in close proximity
- Plant and materials likely to be ejected as far as adjoining structures
- Interdependence of one structure on another

High off-site casualty potential:

- Ejected plant or materials likely to breach site boundary
- Site in close proximity to major railway lines or high-speed roads
- Site in close proximity to densely populated areas or buildings, e.g. in town or city centres
- Vulnerable groups in close proximity, e.g. hospitals or schools

Factors tending away

Limited potential energy in system:

- Low rise buildings or structures where failure is likely to be limited to only parts of the structure
- Release of flammable gases from low pressure systems
- Fire loading similar to that when a building is in occupation

Potential energy could be released progressively:

- Signs of distress or failure evident before collapse commences
- Collapse likely to be restricted to only relatively small sections of building or structure
- Energy release likely to occur in a predictable way
- Instantaneous explosion potential low fire could start relatively slowly triggering alarms or providing other warning signs which give sufficient time for safe evacuation

Low potential domino effect:

- Adjoining buildings, structures, services or transport corridors a considerable distance away
- Any ejected plant or materials unlikely to reach adjoining structures

Low off-site casualty potential:

- Site away from densely populated areas
- No transport corridors in close proximity to site
- Ejected plant or materials likely to be contained within site boundary



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Factors tending towards

Innovative materials/ techniques involved:

- New materials being used or traditional materials being used in new ways
- Structures of this type never previously constructed (internationally or by UK contractors)
- Novel construction methods employed
- Last-minute changes

Poor escape options:

- Limited means of escape for workers due to factors such as restricted alternative means of escape, e.g. tunnels
- Method of escape relatively slow, e.g necessitating use of limited capacity plant such as hoists or via. specialist equipment, e.g. airlocks
- Distance to place of safety long
- Large numbers of workers might require evacuating simultaneously

Poor processes:

- Lack of adequate risk management Lack of independent checks and reviews
- Inadequate time
- Lack of team competency

Factors tending away

Standard materials and techniques involved:

- Traditional materials being used in traditional ways
- Structures of this type widely constructed
- Standard construction methods employed
- No last-minute changes

Good escape options:

- Alternative means of escape available for workers
- Distance to place of safety short
- All workers can evacuate quickly
- Escape possible on foot

Good processes:

- Good risk management
- Competent team
- Adequate time to consider and implement
- Suitable independent advice and review

Action to be taken:

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Status:

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Further help & contacts:

If you need any further information or guidance please contact any member of the Health, Safety & Security Team.

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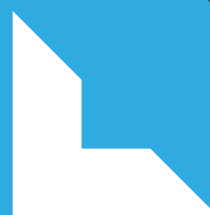
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